

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Project Procedures**

TITLE: Leaking Storage Tanks Investigation Procedures EFFECTIVE DATE: August 9, 2002

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SUMMARY OF REVISIONS: Minor changes have been made throughout these procedures to
reflect organizational changes.

APPLICABILITY: The measures discussed are designed for leaking underground and
above ground petroleum, and other hazardous substances, storage
tank investigations. The procedures discussed herein may be
applicable to all ESP personnel who are involved in sampling where
verifiable and defensible field and analytical data are required.

DISTRIBUTION: MoDNR Intranet
ESP SOP Coordinator

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 SCOPE AND APPLICABILITY

- 1.1 Releases of petroleum from leaking underground and above ground storage tanks or their associated distribution lines are the most prevalent single cause of environmental contamination today. Petroleum releases can ruin groundwater supplies, create explosive atmospheres in private residences and businesses, and cause fish kills in waterways of the state. Finding the source of a petroleum release can be very difficult due to a wide range of influencing factors that may include the natural geology of the site, man-made conduits, depth of the water table, and soil type. This procedure will help the field investigator more easily assess the source and to identify the areal extent of a contaminant plume.
- 1.2 The following procedures are applicable to all Environmental Services Program (ESP) personnel (investigators) who conduct environmental assessments involving the release of hazardous substances to soil and potentially, to groundwater. The procedures are especially designed for work under the Leaking Petroleum Storage Tank (LPST) Quality Assurance Project Plan (QAPP), including environmental emergency responses (EERs) where leaking storage tanks are suspected.

2.0 SUMMARY OF PROCEDURE

The following procedures will lead the investigator through an assessment of a site from the file search to the final report. Generally, assessments of tank sites should be conducted according to the LPST QAPP, and in a manner consistent with procedures outlined in ASTM Standards on Environmental Site Assessments for Commercial Real Estate, Procedures - E 1527-00 "Standard Practice for Environmental Site Assessments: *Phase I Environmental Site Assessment Process*" (hereinafter E 1527-00). A checklist modified from standard E 1527-00 has been attached to this project procedure as Appendix A. Site specific sampling plans and health and safety plans may also provide site-specific procedures for sample collection and safety precautions. Intrusive investigations using the Geoprobe will be conducted in many cases to determine or confirm the source of contamination or to determine the extent of known contamination.

3.0 DEFINITIONS AND ACRONYMS

- ALPD - Air and Land Protection Division
- APR - Air Purifying Respirator
- Buddy System - A safety system where each person works directly with another, or a "buddy", in a two-person team
- CAS - Chemical Analysis Section
- EER - Environmental Emergency Response
- EnCore - Sampling device used to collect soil samples for volatile organics analysis
- FID - Flame Ionization Detector
- Geoprobe - A hydraulic push probe device for collecting depth discrete soil samples
- HASP - Health and Safety Plan
- HAZWOPER - Hazardous Waste Operations and Emergency Response

- HSERP - Hazardous Substance Emergency Response Plan
- Macro-Core - A stainless steel tubing designed to accept liners for collecting continuous core samples
- MIP - Membrane Interface Probe. A probe attachment to the Geoprobe that allows volatile organic compounds to be detected through a heated membrane where they can be returned to PID and FID instruments for depth discrete, in-situ detection
- PETG - Polyethylene terephthalate with glycol
- PID (Photoionization Detector) - A portable air monitoring instrument used to measure the amount of ionizable organic vapors present
- PVC - Polyvinyl chloride
- Safety Officer - The person, generally the ESP sampler, who is assigned or assumes the duties of the health and safety officer for a specific investigation
- VO - Volatile organics
- VOA - Volatile organics analysis

4.0 HEALTH AND SAFETY REQUIREMENT

- 4.1 For any sampling investigation that occurs at a hazardous waste site, site specific health and safety requirements shall be described in the HASP. A site safety meeting shall be conducted by the ESP project manager or safety officer. The meeting shall take place in the field prior to conducting fieldwork. All personnel directly involved in the fieldwork shall read and sign the HASP. While conducting field activities, the safety officer shall place a copy of the HASP in a location readily available to all field personnel. Any alterations to the plan shall be explained and documented in the field notebook.
- 4.2 All EER related work shall be conducted in accordance with the HSERP.
- 4.3 Missouri One Call (1-800-DIG-RITE), as well as all non-member utilities, shall be contacted prior to any subsurface probing. All local requirements concerning special worker signs, flashing lights, or orange pylons shall be observed.
- 4.4 All additional health and safety requirements noted in MDNR-FSS-212 *Operation of the Geoprobe Soil Probing System* and other SOPs referenced in these procedures should be strictly adhered to.
- 4.5 A fire extinguisher shall be within easy reach at all times when the Geoprobe is in operation.

5.0 PERSONNEL QUALIFICATION

- 5.1 All personnel involved in assessments of LPST sites must have attended the 40-hour HAZWOPER training, including current refreshers and medical monitoring, as required by EPA's 40 CFR Part 311.

- 5.2 Personnel who operate the Geoprobe must be familiar with and have met the requirements of MDNR-FSS-212 *Operation of the Geoprobe Soil Probing System*.
- 5.3 All personnel who install boreholes or wells in excess of 10 feet must have a valid Missouri well driller's permit issued by the Geological Survey and Resource Assessment Division (GSRAD).
- 5.4 All personnel involved in the collection of soil samples where hazardous substances may be encountered must:
- attend the 40-hour HAZWOPER training as required by EPA's 40 CFR Part 311, referencing OSHA 29 CFR Part 1910;
 - attend an annual 8-hour health and safety refresher course, or receive equivalent training;
 - participate in the ALPD medical monitoring program;
 - receive appropriate on-the-job training;
 - be familiar with the HSERP, written and maintained by the ESP;
 - be familiar with the ESP SOP manual and have read all SOP documents that are applicable to the field activities, including but not limited to those referenced in this SOP;
 - attend EPA's "Sampling for Hazardous Materials" training (or equivalent).

6.0 SUPPLIES AND EQUIPMENT

A list of supplies and equipment is included in this document under Appendix B.

7.0 PROCEDURES

7.1 Pre-Field Preparation

7.1.1 The investigator shall be familiar with the in-house files and contact the Hazardous Waste Program (HWP) Tanks Section and regional offices for additional file information. S/he should discuss the investigation with the HWP Tanks Section Project Manager assigned to the site. The investigator shall define, as completely as possible, the objective of the investigation and the plan of approach (this may be in the form of a site sampling plan or scope of work plan). The potential responsible parties and other influences, the extent of the contamination, the potential receptors, and potential migration pathways are some of the primary concerns that the investigation will address. An extensive checklist for the Phase I (as identified in E 1527-00) portion of the investigation is attached as Appendix A.

7.1.2 A health and safety plan will be developed for each site.

- 7.1.3 When possible, the investigator should contact local officials (Assessor, Collector/Clerk, Engineer, Water and Sewer Department), local historical societies, county health agent, conservation agent, and MERC/LEPC offices for any information concerning the site's background and history. General information on soil type can be gathered from USDA-NRCS soil survey publications. Other officials with knowledge of the area may include GSRAD for depth to bedrock, hydrology, and well logs.
- 7.1.4 When available, the investigator should obtain copies of sewer maps, utility layouts, street maps, USDA-NRCS maps from the county seat, and topographical maps and aerial photographs for structural history, drainage and surface waterway locations in the area.
- 7.1.5 A field logbook (MDNR-FSS-004 *Field Documentation*) and a sketchbook should be prepared for the investigation. The sketchbook should be large enough to contain detailed sketches and record field instrument data such as PID readings. Graph paper is valuable for ratio and proportion. Both the logbook and sketchbook should also be marked with the HWP Tanks Section ST number and job code number.
- 7.1.6 The investigator should prepare an equipment checklist of items to be taken to the field. An example is attached as Appendix B. Each item should be checked in the office prior to use in the field to insure proper function and to ensure that all equipment is available. It should not be assumed that the equipment is operational and that all parts and components are available.

7.2 Site Reconnaissance

- 7.2.1 Whenever possible, a site reconnaissance should be conducted prior to any intrusive investigations. Typically, at least one or more possible sources of a petroleum release can be determined through common sense observations such as those cited in E 1527-00, section 8, Site Reconnaissance.
- 7.2.2 Notes should be added to the sampling/scope of work and health and safety plans to document the rationale for any changes that may need to be made as a result of information learned during the reconnaissance.

7.3 Interviews

- 7.3.1 Although owners and managers are frequently reluctant to admit responsibility for an environmental release, interviews can often greatly reduce the extent of costly intrusive investigations that are frequently required to locate and/or verify the contaminant source(s). Interviews with neighbors, local government agencies, and suppliers may also be very beneficial to the investigator. The investigator should progressively develop a list of interview questions based on the information gained through file reviews, observations during the

reconnaissance, and previous interviews.

7.4 Intrusive Investigations

- 7.4.1 When non-intrusive information fails to confirm suspected sources of a release, or when information concerning the extent of a release is necessary, an intrusive investigation may need to be conducted. Prior to an intrusive investigation, Missouri One Call (1-800-DIG-RITE) shall be notified and an on-site meeting arranged to identify all areas where possible intrusion may occur so that all underground utilities can be located and marked.
- 7.4.2 The Geoprobe is primarily used for intrusive investigations because of its versatility and ease of use. The Geoprobe can be used with the membrane interface probe (MIP) to obtain real time PID, FID, and conductivity readings at depth. The Geoprobe can also be used to collect core samples, and install microwells (see MDNR-FSS-212 *Operation of the Geoprobe Soil Probing System*).
- 7.4.3 At small sites or in tight areas where the Geoprobe is not practical, a simple slide hammer may be used for shallow soil-gas readings using a handheld PID.
- 7.4.4 In some cases, a backhoe may be used. The backhoe allows the investigator to observe the soil firsthand and the trench excavated with the backhoe can be used to recover free product that may be moving through soil lenses or along a conduit.
- 7.4.5 The investigator will weigh the extent of an intrusive investigation against the cost and amount of beneficial data that may be obtained. Factors such as karst geology, the number of man-made conduits, soil type and structure, and the depth to groundwater are also factors in the type and quality of data obtained from an intrusive investigation.

7.5 Sampling Techniques

- 7.5.1 Two general methods of sampling are used: Biased Sampling and Grid Sampling. The most time efficient method is the biased method, which generally should be applied first to the most likely scenarios.
 - The biased method consists of attempting to locate the main avenue of petroleum migration from the outbreak or discharge to the most logical source. The investigator will place the MIP, for example, along a straight-line between the suspected source and an impacted downgradient sewer. Detection of volatile organics (VOs) using the MIP would indicate the presence of the contaminant plume. The MIP can then be used to trace the contamination back to the source. If no hits occur, the second most likely scenario will be tested, and so on.

- The grid method consists of plotting a grid, usually 10' X 10', and sampling at each intersect. The resulting data generates a mosaic image of the plume at a given depth, which eventually can lead to a source(s). This technique is usually less time efficient, depending on the information available.

7.5.2 Sample point placement for biased sampling is dependent upon many site-specific factors, but the following rules of thumb may be used (intended only as guidance for an investigation and should be modified by site-specific conditions).

- In tight clay soils, sample points should be placed within 1-3' of the edge of a tank pit or product line to detect potential sources. For moderately permeable soil (silty soils) and sandy soils, sampling points up to 10' away may be adequate to show product movement.
- Soil type also influences sampling depth. In tight soils, the investigator must sample to at least 2-3' below the bottom of the tank pit (typically, tank pits are around 15' in depth). For moderately permeable soils, placement should be at least 10' below the ground surface and for sandy soil, sometimes as little as 6' may be acceptable to locate VO vapors that may indicate a petroleum leak. The investigator should be aware that all of these sampling points could be affected by the presence of water and/or other barriers.

7.5.3 Although good judgement and experience are the main factors in conducting a successful investigation, other factors can affect sampling success.

- Environmental conditions such as temperature and moisture may affect the ability of the investigator to collect reliable data. These conditions may affect the efficiency of sampling instruments, the ability to collect representative samples for volatile compounds, and the ability to locate the proper sample depth. For example, sampling for VOs is different in the winter than in mid-summer because temperature affects volatility and vapor pressure. It is crucial for summer sampling of VOs to minimize sample exposure to the atmosphere and to limit agitation of the sample (see MDNR-FSS-006A *Sampling Water and Other Liquids for Volatile Organic Analysis* and MDNR-FSS-006B *Sampling Soil and Other Solid Media for Volatile Organic Analysis*). Water samples must be chemically preserved and put on ice to minimize biodegradation (see MDNR-FSS-001 *Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations*).
- Soil type, soil lenses, depth to bedrock, fractures, man-made conduits, and hydraulic pressures are just some of the factors that play a major role in defining product movement underground. Most Missouri soils are clays or silts that have limited porosity. When attempting to locate plumes in these conditions, the investigator must actually intercept or come within close

proximity of free product. Because petroleum is lighter than water, it is usually found at the level of the water table or above. In many areas of Missouri, however, the water table is very deep. In these areas, sample depth should extend to bedrock, due to the presence of porous material at the soil/rock interface. Also, water generally collects at this zone and can carry product great distances from its point of origin.

- 7.5.4 Procedures for the various types of sampling that may be required during an investigation are covered within: MDNR-FSS-005 *General Sampling Considerations Including the Collection of Grab, Composite, and Modified Composite Samples from Streams and Wastewater Flows*, MDNR-FSS-006A and B, for sampling liquids and solids, respectively, for volatile organics analysis, MDNR-FSS-007 *The Collection of Samples from Wells*, MDNR-FSS-009 *Collection of Samples from Tanks*, MDNR-FSS-010 *Collection of Soil Samples*, and MDNR-FSS-011 *General Considerations for Sediments*.
- 7.5.5 All field instruments shall be calibrated prior to use in accordance with the manufacturers' instructions and SOP MDNR-FSS-200 *Equipment Calibration and Preventative Maintenance*.
- 7.5.6 Appropriate trip/field blanks and duplicate/replicate split samples should be taken as listed by the applicable QAPP or the requesting agency. Quality control measures taken during field sampling shall follow procedures outlined in MDNR-FSS-210 *Quality Assurance/Quality Control for Environmental Data Collection*.
- 7.5.7 The investigator will be prepared to provide split samples for use by the property owner and/or responsible party.
- 7.5.8 Other procedures that apply when collecting samples include MDNR-FSS-002 *Field Sheet and Chain-of-Custody Record*, MDNR-FSS-003 *Sample Numbering and Labeling*, MDNR-FSS-018 *Sample Handling: Field Handling, Transportation, and Delivery to the ESP Lab*.
- 7.5.9 Procedures for the use of various field instruments and equipment used during an investigation include: MDNR-FSS-106 *Field Analysis of Flash Point*, MDNR-FSS-203 *Measurement of Organic Vapors in the Field*, and MDNR-FSS-204 *Field Operation of Explosimeter and Measurement of Explosivity*.

7.6 Survey Completion

Upon return from an intrusive investigation, samples will be relinquished to the ESP sample custodian (see MDNR-FSS-018 *Sample Handling: Field Handling, Transportation, and Delivery to the ESP Lab*). All unused supplies and clean equipment will be returned to the appropriate storage areas, all soiled equipment will be cleaned and decontaminated (see MDNR-FSS-206 *Decontamination Procedures for Sampling*

Equipment), and any malfunctioning equipment will be marked for repair.

7.7 Reporting

Immediately after completion of a survey, a report will be written in accordance with the appropriate QAPP. After the analyses of all samples have been completed, the CAS will submit the results to the sample collector who will attach them to the report. The report will be sent to his/her supervisor for approval. The original report will then be approved and signed by the ESP Program Director, filed at the ESP, and copies sent to the appropriate personnel.

8.0 REFERENCES

- MDNR Field Services Section SOPs
- Leaking Petroleum Storage Tank Quality Assurance Project Plan
- ASTM Standards on Environmental Site Assessments for Commercial Real Estate, Procedures E 1527-00 "Standard Procedures for Environmental Site Assessments: *Phase I Environmental Site Assessment Process*"

APPENDIX A

PHASE I ASSESSMENT CHECKLIST (Modified from ASTM Standard E 1527-00)

RECORDS REVIEW

-General-

Appropriate Minimum Search Distance

- Nearest property boundary
- Justification for reduction of the appropriate minimum search distance (based on density, distance of migration potential, etc.)

Accuracy and Completeness

- Make note of suspicions of mistakes or insufficiencies in information reviewed and the reason for such.

Reasonably Ascertainable/Standard Sources

- Publicly Available
- Reasonable Time and Cost (20 days or less and nominal cost)
- Practically Reviewable (specific, not general)
- Source update frequency (e.g. 90 days)
- Documentation of source (even if it revealed no findings)
- Significance (of listing to the analysis of recognized environmental conditions in judgement of reviewer)

-Environmental Information-

Standard Record Sources Used with Minimum Search Distance

- Federal NPL site list (1.0 mile)
- Federal CERCLIS list (0.5 mile)
- Federal RCRA TSD facilities list (1.0 mile)
- Federal RCRA generators list (property/adjoining property)
- Federal ERNS list/DNR Spill Reports (1.0 mile)
- State lists of hazardous waste sites (NPL and CERCLIS equivalents)
- State landfill lists (0.5 mile)
- State LUST lists (0.5 mile)
- State UST registration lists (property/adjoining property)

Other Environmental Record Sources: State or Local

- Spill Reports (DNR-ESP)
- Contaminated Wells [GSRAD-Wellhead Protection (well installation records from 1986 to present)]
- Department of Health
- Local Fire Department
- City Planning Department
- City Building Permit/Inspection Department
- City Pollution Control Agency
- Local Electric Utility (PCB information)

Physical Setting Sources

- USGS (GSRAD) Topographic Maps (7.5 Minute)
- USGS Groundwater Maps
- USGS Surficial Geology Maps
- NRCS Soil Maps

Historical Use Information

- Uses of the property (from 1940 to present)
- General types of use (e.g. industrial, manufacturing, airport, railroad, retail, other commercial, school, residential, agricultural)
- Uses of property in surrounding area (with likelihood of migration of hazardous substances)
- Standard Historical Sources
 - Aerial photographs (city engineer, library, etc.)
 - Fire insurance maps (libraries, historical societies, private, map companies)
 - Property tax files (county assessor)
 - Recorded land title records (title companies, county recorder of deeds)
 - USGS 7.5-Minute Topographic Maps
 - Local street directories (from libraries, universities, or historical societies)
 - Building Department Records (city or county)
 - Zoning/Land use records (often in city planning department)
 - USDA-NRCS Maps (for agricultural/rural areas)

SITE RECONNAISSANCE

-Observations-

The property exterior should be viewed from all adjacent public thoroughfares (dead-end roads, alleys, etc. should be explored for possible illegal disposal paths)

Interior of structures

- accessible common areas (lobby, hallway, utility room, recreation room)
- maintenance and repair areas

- representative samples of occupant spaces

Document limitations to observations (physical obstructions, water, paved areas, etc.)

-General Site Setting-

- Current Uses of Property
 - Any use likely to involve the use, treatment, storage, disposal, or generation of hazardous substances or petroleum products
 - Unoccupied occupant spaces
- Past Uses of the Property (e.g. signs of past use or structure indicating a past use)
- Current Uses of Adjoining Properties
- Past Uses of Adjoining Properties (observations, record reviews, interviews)
- Current or Past Uses in Surrounding Area (if they indicate recognized environmental conditions in connection with the property)
- Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions (if hazardous substance is the type that may migrate with such conditions)
- General Description of Structures (number of buildings, number of stories of each, approx. age, ancillary structures, etc.)
- Road (describe public roads, streets, and parking facilities acquire detailed maps if possible)
- Potable Water Supply (type)
- Sewage Disposal System (type, age)

-Interior and Exterior Observations-

- Current Uses of Property
- Past Uses of Property (e.g. signs indicating a past use or a structure indicating a past use)
- Hazardous Substances and Petroleum Products in Connection with Identified Uses (quantities, types of containers, and storage conditions)
- Storage Tanks (type, content, capacity, age)
- Odors (observed or from record review or interview)
- Pools of Liquid (pools or sumps likely to contain hazardous substances)
- Drums (contents if known, capacity, leaking/non-leaking)
- Hazardous Substance and Petroleum Products Containers (not necessarily in connection with identified uses)
- Unidentified Substance Containers
- PCBs (electrical or hydraulic equipment (except fluorescent light ballast)

-Exterior Observations-

- Pits, ponds, or lagoons
- Stained soil or pavement
- Stressed vegetation
- Solid waste (filled or graded areas, mounds, depressions)
- Wastewater (drains, storm water, any discharge into drain, ditch or stream on or adjacent to property)
- Wells (active, dry, irrigation, abandoned, etc.)
- Septic systems
- Patches in pavement (possibly related to USTs)

INTERVIEWS

-Medium-

In person, by Telephone, or in Writing

-Who Should be Interviewed-

Key Site Manager (often the property manager, chief physical plant supervisor, or head maintenance person)

- Make at least one reasonable attempt (in writing or by telephone) to arrange a mutually convenient appointment for the site visit when the key site manager agrees to be there

Occupants (attempt to interview a reasonable number)

Residential and Multi-Family Properties

- Residential occupants do not need to be interviewed

If property has nonresidential uses, interview major occupants

- Major Occupants
 - If five or less current occupants make reasonable attempt to interview a representative of each of them
 - If more than five, make reasonable attempt to interview those whose operations are likely to indicate recognized environmental conditions in connection with the property

Local Government Officials

Who Should be Interviewed

- Local fire department that services the property
- Local health agency serving the property
- Local/regional agency having jurisdiction over hazardous waste disposal or other environmental matters in the area in which the property is located.

Quality of Answers (ask interviewee to "answer in good faith and to the extent of their knowledge")

Prior Assessment Usage (If person was interviewed in a previous site assessment it is not necessary to re-interview, except for new developments)

-Helpful Documents-

- Environmental site assessment reports
- Environmental audit reports
- Environmental permits (e.g. solid waste disposal permits, haz. waste disposal permits, wastewater permits, NPDES permits)
- Registrations for USTs and ASTs (DNR-HWP; DOA)
- MSDS
- Community right-to-know plans
- Safety plans; preparedness and prevention plans; SPCC (spill prevention, countermeasure, and control) plans, etc.
- Hydrogeologic condition reports (e.g. from city engineer)
- Notices or other correspondence from any governmental agency (NOVs, environmental liens, etc.)
- Hazardous waste generator notices or reports (DNR permits units)
- Geotechnical studies (IR, seismic, etc.)

-Proceedings Involving the Property-

Prior to the site visit ask the key site manager if s/he knows of:

- Any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the property,
- Any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the property, and
- Any notices from any governmental entity regarding any possible liability relating to hazardous substances or petroleum products.

EVALUATION AND REPORT PREPARATION

See ASTM Standard E 1527-00

Standard Source Summary *

1. Federal NPL list
2. Federal CERCLIS list
3. Federal RCRA TSD list
4. Federal RCRA generators list
5. Federal ERNS list/ DNR- ESP Spill Reports
6. State lists of hazardous waste sites (NPL & CERCLIS equivalents)
7. State landfill lists
8. State LUST lists
9. State UST registration lists
10. State well installation records (GSRAD-Wellhead Protection, records from 1986 to present)
11. DHSS (Section of Environmental Public Health)
12. Local Fire Department
13. City Planning Department
14. City Building Permit/Inspection Department
15. Local Pollution Control Agency (e.g. City Health Department)
16. Local water quality agency
17. Local electric utility (PCB transformers)
18. Maps (Topographical, Groundwater, Surficial Geology, Soil)
19. Aerial photographs (city engineer, library, and historical society)
20. Fire Insurance Maps (libraries, historical societies, and private companies)
21. Property tax files (county assessor)
22. Recorded land title records (title companies, county recorder of deeds)
23. Local street directories (libraries, universities, historical societies)
24. Local building department records
25. Zoning/Land use records (city planning department)
26. Environmental site assessments
27. Environmental audits
28. Environmental permits (DNR-SWMP, HWMP, WPCP, and APCP)
29. DOA Petroleum Pump Inspection records
30. MSDS
31. EPCRA plans
32. SPCC plans
33. Hydrogeologic reports (city engineer)
34. Enforcement documents (DNR-SWMP, HWMP, WPCP, APCP; DOA; DOH; DOC; city) Contact would be made with central offices, regional offices and local agents.

*: Make note of suspicions of mistakes or insufficiencies in information reviewed and the reason for such.

LAND USES TYPICALLY ASSOCIATED WITH HAZARDOUS WASTES

1. Repair and maintenance of motor vehicles
2. Electroplating and other metal manufacturing and fabricating
3. Metal finishing, refinishing, and etching (e.g. auto body)
4. Printing and photocopy operation and repair
5. Dry cleaning and laundry
6. Photographic processing and printing
7. Analytical laboratories
8. Construction contracting
9. Pest control
10. Chemical manufacture, formulation, or processing
11. Warehouses
12. Pesticide or agricultural products manufacturing, formulation, or processing
13. Garden & Home, pool, or agricultural supply manufacturing
14. Textile manufacturing
15. Furniture or wood products manufacture, refinishing, or stripping
16. Cosmetic manufacturing or processing
17. Lawn, garden, yards, trees treatment or landscaping
18. Pressure treating or preserving wood products
19. Boat production or repair
20. Shoe production or repair
21. Paint formulation and mixing
22. Metal galvanizing.
23. Drum, barrel and tank reconditioning
24. Battery manufacturing, rebuilding or recycling
25. Solvent recycling
26. Scrap metal and junk yard businesses
27. Chemical and petroleum storage facilities
28. Landfills
29. Bulk delivery of raw or processed materials
30. Vehicle or equipment rental, fleet operations
31. Distribution, consolidation, and shipping
32. Incinerators
33. Nursery and greenhouses
34. Schools, auditoriums, warehouses, etc. (large heating requirements)
35. Recycling

APPENDIX B

Leaking Underground Storage Tank Field Investigation S.O.P.

Example Field Equipment Checklist

Field Equipment

5-gm and 25-gm En Core sampler devices w/T-handle
aluminum mixing pans
analyte-free water for the collection of rinsate (equipment) blanks
appropriate sample containers and preservatives
bucket augers
camera and film or digital camera
cellular phone
Chain-of-Custody Record
Coliwasa
concrete asphalt patch
cooler(s) with ice
copies of applicable Standard Operating Procedures
cord for lowering bailers into a well
decontamination supplies for personnel and equipment (Simple Green, brushes, DI water, etc.)
disposable bailers (PVC or Teflon)
explosimeter
field blanks
field notebook and sketch book
Geoprobe (see MDNR-FSS-212 for equipment list)
glass thief tubes
GPS unit
Grundfos or Fultz pump and associated equipment
heavy duty Ziplock bags (for packaging and storage of filled sample containers)
hexane/methanol
interface probe
level D personal protective equipment
nitrile gloves and other appropriate personal protective equipment (PPE)
oil-water interface probe
paper towels
peristaltic pump and associated equipment
pH meter and/or pH paper for field analysis

PID
plastic sheeting
reference file box
rope or cord
sample labels (both pre-numbered and blank)
shovel and pick
stainless steel and or Teflon spoons or trowels
test tubes
trash bags
trip blanks
water level indicator
wide-mouth glass sample jars with Teflon lined lids
zone or bomb samplers